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Combined Forest Pest
Research and
Development Program

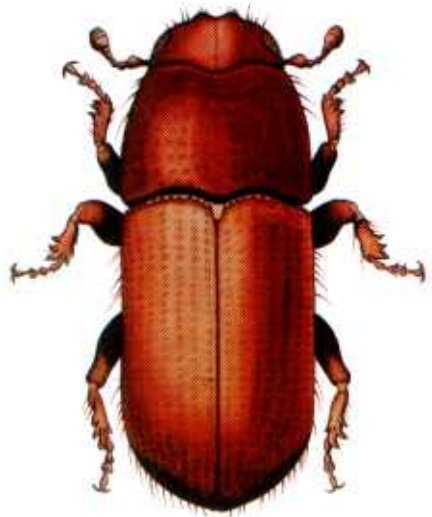
Agriculture
Handbook No. 575

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**Southern Pine
Beetle Handbook**

**Direct Control
Methods for the
Southern Pine
Beetle**

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Contents

In 1974, the U.S. Department of Agriculture initiated the Combined Forest Pest Research and Development Program, an interagency effort that concentrated on the Douglas-fir tussock moth in the West, on the southern pine beetle in the South, and on the gypsy moth in the Northeast. The work reported in this publication was funded in whole or in part by the Program. This manual is one in a series on the southern pine beetle.

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ERRATA SHEET

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p. 9. – Figure 3, line 3, should read – Yellow trees are fresh attacks; red trees contain developing broods; bare trees are vacated.

Direct Control Methods for the Southern Pine Beetle

by

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and Michael C. Remion¹**

Introduction

The southern pine beetle (SPB) is the most destructive pine bark beetle in the South. In 1979 alone, it killed enough timber to build 34,500 homes. The trees are killed singly, in small groups, or in large numbers over hundreds of acres. Outbreaks commonly originate in poorly managed or overstocked stands. Once underway, an outbreak may last for several years and can spread rapidly into managed stands—including urban areas.

SPB-caused timber losses can be reduced through application of one or more recommended control tactics. These include direct control methods for treating individual trees and infestations (spots) (fig. 1) and indirect methods involving the proper management of potentially susceptible forests. This handbook describes currently recommended direct control practices.² These measures will minimize timber losses during outbreak periods.

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² The Expanded Southern Pine Beetle Research and Applications Program has published other handbooks that are companion pieces for the present manual. These include "A Field Guide for Ground Checking Southern Pine Beetle Spots" (Agriculture Handbook No. 558), by R.F. Billings and H.A. Pase; "An Aerial Observer's Guide to Recognizing and Reporting Southern Pine Beetle Spots" (Agriculture Handbook No. 560), by R.F. Billings and C. Doggett; and "Silviculture Can Reduce Losses from the Southern Pine Beetle" (Agriculture Handbook No. 576), by R.P. Belanger and B.F. Malac.



Figure 1.—Active SPB infestation.

Treatment Priorities

Southern pine beetle spots must be located before they can be treated. Normally, most SPB spots can be detected from the air, particularly during the summer months. Aerial observers use foliage color (red and fading) and number of dying trees to assign a priority for ground checking to each spot. Field crews then ground check the spots to confirm the cause of tree mortality and to determine the need for treatment. Higher priority spots are treated first since they have a greater potential for additional tree mortality than medium- or low-priority spots. Control decisions depend not only on the priority of the spot, but also on the availability of crews and equipment, the size and number of trees or volume of timber in the spot, accessibility, and current market conditions for beetle-killed timber. The criteria presented in tables 1 and 2 should be noted when setting control priorities.

1. High-priority spots—those with the greatest number of SPB-infested trees—should be marked for treatment first. Salvage removal is the preferred treatment. Because of the dynamic nature of SPB infestations, the time lapse between marking and cutting should be as short as possible. The longer the time, the greater the chance that additional trees will be attacked. If this happens, the spot

will have to be re-marked. In summer, no more than 4 weeks should elapse between marking and treatment. If trees cannot be salvaged in that timespan, another control method should be considered.

2. As a general rule, medium-priority spots should not be marked for treatment until all high-priority spots have been treated. But when a medium-priority spot is located near a high-priority infestation, it may be desirable to treat both at the same time.

3. Low-priority spots seldom require treatment. Research has shown that most of them die out, particularly in summer. Spots that continue to expand should be detected during the next aerial survey and assigned a new priority for ground checking.

Table 1.—*Guide to southern pine beetle spot growth and control priorities (May through October)*

Key to spot growth	Your spot's classification	Risk-rating points
A. Fresh attacks	absent	0
	present	30
B. Number of freshly attacked trees and those with developing brood	1–10	0
	11–20	10
	21–50	20
	more than 50	40
C. Pine basal area (or stand density) at active head(s) (ft ² /acre)	less than 80 (low density)	0
	80–120 (medium density)	10
	more than 120 (high density)	20
D. Average size class of timber (in inches)	pulpwood (9 in or less)	0
	sawtimber (more than 9 in)	10

Add up the risk-rating points that apply to your spot.

Score	Control priority
0– 30	Low
40– 60	Medium
70–100	High

Table 2.—*Symptoms associated with various stages of SPB-attacked trees*

Symptom	Fresh attacks	Developing broods	Vacated trees
Foliage	Green	Green trees with larvae; fade to yellow before brood emerges	Red, needles falling
Pitch tubes	Soft white, light pink	White, hardened	Hard, yellow, crumbles easily
Checkered beetles	Adults crawling on bark	Pink or red larvae about ½ in long in SPB galleries	Larvae and pupae are purple; occur in pockets in the outer bark
Bark	Tight, hard to remove	Loose, peels easily	Very loose, easily removed
Color of wood surface	White, except close to new adult galleries	Light brown with blue or black sections	Dark brown to black
Exit holes	—	Few, associated with attacking adult reemergence	Numerous
Ambrosia beetle dust	—	White, localized areas around base of trees	Abundant at base of trees



Suppression should be a year-round effort. Major efforts should be made from late spring through fall to control actively spreading infestations. Winter and early spring treatment is also important because it will reduce the potential for spot growth and/or new spot development later in the spring and summer. Although infestations are concentrated in fewer trees for longer periods of time during the colder months, the spots are harder to detect from the air.

The landowner's management objectives will definitely influence the selection of one or several treatment methods. Currently recommended treatment methods include (1) salvage removal, (2) cut-and-leave, (3) chemical control, and (4) pile-and-burn. The following paragraphs explain how to perform these four techniques.

Figure 2.—Salvage logging.

Salvage Removal

- this is the preferred treatment.

Managers and owners usually prefer salvage removal (fig. 2) over the other control options because infested trees are removed from the forest and used, giving the land-owner some financial return. However, salvage of individual spots is not always practical because of inaccessibility, insufficient volume, poor lumber or pulpwood market, and sensitive environmental constraints. In addition, salvage removal often takes longer to implement than alternative tactics.

For salvage to be effective, SPB-infested material must be removed on a timely basis. An adequate buffer strip of uninfested green trees must also be cut around the spreading edges of the spot. Doing this ensures the removal of freshly attacked pines that were overlooked or became infested after the spot was initially ground checked and marked.

Procedures for Salvage Removal

1. Identify the spreading head(s) of the spot. The head(s) contains the trees that have been recently attacked. They may have green or fading foliage, fresh pitch tubes, boring dust in bark crevices or on the foliage of understory vegetation, tight bark, and adult checkered beetles on the bark.
2. Mark all SPB-infested trees or a boundary around them if there are many trees.
3. If recently attacked trees are present, mark a horseshoe-shaped buffer strip of green uninfested trees around the head(s). The buffer should surround the recently attacked trees. A strip 40 to 70 ft wide will be needed for most active spots, while a 100-ft strip (and occasionally larger) may be needed for large, rapidly expanding spots (fig. 3). As a rule, the width of the buffer should not exceed the average height of the trees in the spot. When a spot has 10 or fewer infested trees, none of which are freshly attacked, it normally should not be treated.

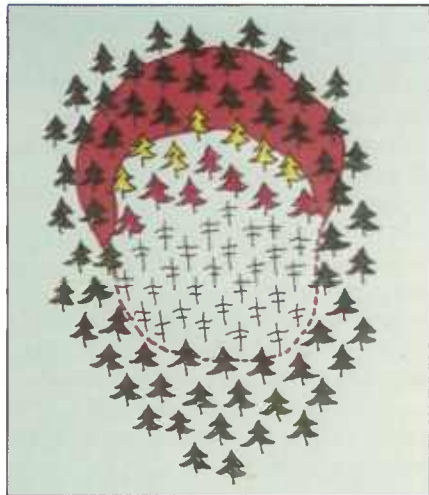


Figure 3.—Red area illustrates a buffer strip around the active head of an infestation. Yellow-green trees contain SPB; red trees are recently killed.

Cut-and-Leave

4. Salvage removal of infested and buffer-strip trees should begin as soon as possible after ground checking and marking the spot. Vacated trees can be left standing (*see* table 2) since their removal will not contribute to beetle control. But they can be salvaged if they have not deteriorated and the additional volume is needed to make the salvage removal economically feasible. Choosing which trees to salvage first depends on the season. The following priorities, in order of importance, should be followed in salvage removal:

May–October

- a) Trees in the buffer zone
- b) Trees with fresh attacks
- c) Remaining trees with living brood
- d) Vacated trees

November–April

- a) Remaining trees with living brood
- b) Trees with fresh attacks
- c) Trees in the buffer zone
- d) Vacated trees

5. Infested trees should not be decked next to green timber because emerging beetles may attack adjacent green trees.

6. Check salvaged spot for breakouts³ during the next aerial survey. Treat breakouts as needed.

The cut-and-leave method was first recommended by the Texas Forest Service for controlling small spots (10 to 50 infested trees) that could not be salvaged. This technique involves felling infested trees and a buffer of uninfested trees and leaving them in the woods. The treatment disrupts spot growth and causes emerging adults to disperse into the surrounding forest. Cut-and-leave should be used during the period when SPB spots are expanding (approximately May to October). Spots should be treated only if they contain trees with fresh attacks. The method has been primarily used in the Gulf Coast States.

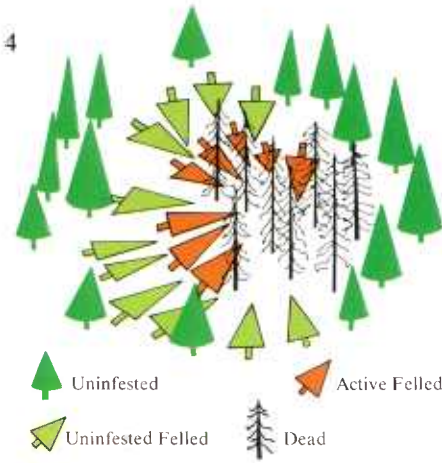
Cut-and-leave is practical, relatively inexpensive, and requires a minimum of manpower, equipment, and training. The procedure can be applied soon after spots are detected. The major disadvantage is that a buffer strip of green uninfested trees must be felled around each spot to assure that newly attacked trees, which favor spot growth, are included in the treatment (fig. 4). If salvage becomes feasible at a later date, though, the felled trees can be removed. Larger spots (51 to 150 trees) can be treated using the cut-and-leave method if the spots will eventually be salvaged.

Procedures for Cut-and-Leave

1. Select spots with 10 to 50 infested trees. Some must have fresh attacks. Higher priority spots—those with a high proportion of newly attacked trees—should be treated first. Spots with more than 50 currently infested

³ When SPB emerging from a treated spot attack neighboring trees, this new infestation is known as a breakout.

Chemical Control



trees can be treated if they are to be salvaged later.

2. Mark and fell SPB-infested trees toward the center of the spot.
3. Mark and fell a horseshoe-shaped buffer strip of green uninfested trees around the trees with fresh attacks. Fell them toward the center of the spot. In small spots, the buffer may encircle the spot. However, the buffer should be no wider than the average height of the trees in the spot.
4. Dead trees from which all SPB have emerged need not be felled. Leaving these trees will allow the beetle's natural enemies to complete their development and emerge. Such trees also provide den sites for certain woodpecker species.
5. Check cut-and-leave spots for breakouts during the next aerial survey. Treat breakouts as needed.

Figure 4.—Illustration of an SPB spot after cut-and-leave.

Insecticides are effective in controlling the SPB in individual trees or small groups of trees. Registered insecticides are available for killing beetles in trees that have been attacked and for preventing attacks on green trees. Although chemical control is costly and subject to environmental constraints, it may be the best alternative in urban forests or high-value recreational areas, and even in limited areas of commercial forests when other methods cannot be used.

The landowner may choose to protect selected high-value trees from attack by applying a preventive spray. Technically, this is not a direct control tactic, but it does prevent attacks and reduce tree mortality in special-use or high-value situations. For short trees, field crews can apply insecticidal sprays with a hydraulic sprayer. Treatment of taller trees usually requires special equipment.

People considering chemical control should contact a local State Forestry office, County Extension Agent, or USDA Forest Service, Forest Pest Management office for the latest information on registered insecticides and their use. Always follow label instructions on the insecticide container.

90% chemical control is being used in the current infestations in Texas, La or MN. 8/5/05



Figure 5.—Chemical treatment of infested tree. Note the insecticide spray pattern.

Procedures for Chemical Control

The following procedures are recommended whenever insecticides are used:

1. Identify and mark all infested trees. Do not mark a buffer strip or vacated trees.
2. Trees containing advanced broods (late larvae, pupae, adults) should be treated first.
3. Infested trees should be felled, limbed, and cut into workable lengths. In larger spots, infested trees should be cut into workable lengths and sprayed as they are felled to ensure complete treatment (fig. 5).
4. Use low-pressure sprayers—hydraulic for large, accessible spots, garden or backpack type for small or inaccessible spots.
5. The entire infested bark surface should be sprayed to the point of runoff. To accomplish this, adjust nozzles so the spray stream is about equal to the tree diameter when the nozzle is held about 1 ft from the bark surface. It may be necessary to turn large logs several times to get complete coverage.
6. Trees should not be sprayed when the bark is wet.



7. Do not spray vacated trees (fig. 6). Spraying such trees serves no useful purpose and, in fact, may kill some of the beetle's natural enemies that are completing their development in these trees. Also, do not spray stumps of infested trees that have been felled.
8. After completing treatment, field crews should check around the spot to see that no infested trees have been overlooked.
9. Check for breakouts during the next aerial survey. Treat breakouts as needed.

Figure 6.—Closeup of pine vacated by the SPB. Note the exit holes.



Felling, piling, and burning infested trees is one of the oldest SPB control methods and is effective when properly done. But because of high costs and environmental constraints, the practice has been used sparingly in recent years. All the bark must be completely burned to achieve control. It is not necessary to cut, pile, and burn vacated trees. For practical reasons, both infested and vacated trees are usually piled and burned to clear the site for regeneration (fig. 7). Burning can cause wildfires, so it should be restricted to periods of low fire danger. Also, Federal and State air pollution laws must be taken into consideration.

Procedures for Piling-and-Burning

1. Identify and mark all SPB-infested trees.
2. Fell all infested trees and pile them in the center of the infested area.
3. Burn the pile until all infested bark has been thoroughly charred.
4. Do not burn if it cannot be done safely or if it will promote significant soil erosion.
5. Check carefully around the spot to ensure that no green infested trees have been overlooked.
6. Check for breakouts during the next aerial survey. Treat breakouts as needed.

Figure 7.—Pile-and-burn treatment.

Numerous State and Federal laws have been enacted to restrict activities that could have adverse impacts on forest and urban environments. Some of these regulations apply to the control procedures discussed in this handbook. A user should be aware of the regulations that apply to the various SPB control method(s) described. To get specific information on the proper procedures to be followed in using each control method and in protecting human health and the environment, contact your local State Forestry office or County Extension office.

These recommendations are based on the current guidelines and operational experiences of the USDA Forest Service and State forestry agencies. The authors appreciate the manuscript reviews provided by State and Federal forest pest control specialists throughout the South. The photographs were provided by the USDA Forest Service and South Carolina Commission of Forestry.